1946th Conference

Renewable Energy & Energy Materials 2018

2nd International Conference on

Renewable Energy and Resources

&

Energy Materials and Fuel Cell Research

August 27-28, 2018 | Boston, USA

Plenary

Day 1

Winfried Hoffmann, Innov Ener Res 2018, Volume 7
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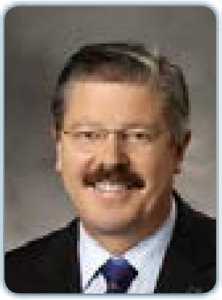

Winfried Hoffmann
Applied Solar Expertise-ASE, Germany

PV as a major contributor to the 100% renewably powered world

Only a few years ago it was difficult to explain a world, powered 100% by renewables only – not only electricity but all secondary energy needs, including transportation, heating, and cooling as well as industry needs. The major reason for this was that the production cost for electricity from wind and solar was – although characterized as most elegant - much too high and electricity storage not seen as an option at all. Only with large centralized solar concentrating systems together with hydrogen production (hydrogen economy) or a world-wide distribution system (using high voltage DC current grids) a renewably powered world was seen potentially possible in the very long run. With the rapidly declining cost per produced kWh from PV and wind, together with the push from the automotive sector for Li-ion batteries which also results in a quick reduction of electricity storage cost, there is now – including IoT (Internet of Things) - a new horizon open how to serve man-kinds energy needs rather quickly with renewables only. After analyzing today's energy needs and how they are served with primary (fossil, nuclear and renewables with ~150 PWh, P=10~15) and secondary energy (electricity, fuel, (process)-heat with ~90 PWh), the future demand for secondary energy is analyzed. Today's energy inequity will be changed to a situation where each person on the globe will have a similar energy usage per year, comparable to the living standard today in the industrialized world. An increase in energy efficiency by a factor of 3 will be explained. The global population for the future world is estimated to be ~10 billion according to UN statistics. With this, the future secondary energy offering has to be ~150 PWh per year. The portfolio of renewable energy technologies is discussed and their respective share analysed. PV is seen as one of the prominent technologies in the future, especially when comparing their production cost – more precise: Levelized Cost of Energy - compared with clean fossil and new nuclear power plants, even when including the necessary electricity storage cost. The crucial role for new materials and processes for future solar cells and modules together with the parallel development of storage devices and fuel cells is emphasized. The transition towards 100% renewable energy makes most sense economically, socially and from an energy security point of view. This and the timely coincidence of several break-through technologies will trigger the transformation towards a 100% renewably powered world quicker as many expect also on a global level.

Biography

Winfried Hoffmann studied solid state physics, diploma in superconductivity and finished with a PhD-thesis in biophysics (laser flash photolysis). He started his industrial career in 1979 at NUKEM/RWE in the area of CdS/Cu2S – Thin-Film solar cells and modules, amorphous Silicon as well as Dye Solar Cells. In the mid-1980s and 90s, a pilot production for MIS-inversion layer c-Si solar cells and large area modules was put in operation. From 1994 he served as Managing Director to "Angewandte Solarenergie - ASE GmbH" (JV DASA and RWE). In the same year the acquisition of 100 % shares of Mobil Solar as a subsidiary company was done with special focus on their developed ribbon EFG technology. In the late 90s the company was renamed RWE Solar and was one of the worldwide 5 biggest production companies. The first inline PE-CVD machines for SiN were developed and built in these years. In 2007 he joined Applied Materials to become Chief Technology Officer and Vice President of the Solar Business Group and member of the Management Board of the German-based Applied Materials GmbH. For many years he was a member in the supervisory board of listed companies (SMA Solar Technology AG and SolarFabrik AG) and was also active in numerous Research Institutes (FhG-ISE, ISFH, Helmholtz Center Berlin, ZSW, and DLR). He served many years in solar associations in order to convince politicians to support the PV market development (German BSW Solar and European EPIA, now SolarPower Europe). Since 2011 he gives lectures about Renewable Energy at the universities Konstanz and Freiburg. In 2012 he received the John Bonda prize from EPIA and the prestigious "European Becquerel Prize for Outstanding Merits in Photovoltaics" from the European Commission. The World Renewable Energy Network (WREN) awarded him as "Solar Pioneer" in 2014.

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Scientific Tracks & Abstracts

Day 1

Jeffrey Lodge, Innov Ener Res 2018, Volume 7
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Food and food processing waste to energy: Sustainable energy for western NY

Jeffrey Lodge
Rochester Institute of Technology, USA

New York is a major producer of milk, yogurt, and cheese in the US. Much of these industries are centered in Western NY and a considerable amount of waste is generated. Western NY is also the home of many small and large Universities/ Colleges that generate significant food waste. Soon in NY food waste/food processing waste will no longer be accepted at landfills and so this must be addressed. Land application of food processing on agricultural land is also a problem that is very tightly regulated. Several options are available for treating food waste and food processing waste which includes treatments to generate energy from food biomass and reduce nutrient loads of food processing waste to allow for land applications or movement to wastewater treatment plants. My lab is approaching these problems through two avenues, anaerobic digestion of food waste and using microalgae to treat food processing waste streams. Both processes ultimately lead to energy production, electricity from AD, biofuels, and electricity from the microalgae. Food waste streams that are readily available include, Greek yogurt and cheese whey, egg processing wastewater, tofu whey, apple pomace, spent coffee grounds, and solid food waste. Solid food waste, yogurt and cheese whey are now being digested at large scale ADs and experiments are ongoing with egg processing waste. Microalgae treatment of yogurt, cheese, and tofu whey along with egg processing waste are ongoing with significant nutrient reduction and use of the algae biomass for fuels. We hope to integrate various processes to provide sustainable energy.

Biography

Dr. Lodge completed his PhD in Microbiology from the University of Mississippi Medical Center before doing postdoctoral research at Utah State University and Boston University. He then took a position in the Thomas Gosnell School of Life Sciences at the Rochester Institute of Technology where he still works today. He has been working on the treatment of food waste and food processing streams to generate sustainable energy for Western NY. He teaches courses in Bioenergy, Wastewater Microbiology, Food Microbiology, and Bioremediation. He is now the Director of Graduate Program in Environmental Science at RIT.

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Notes:

Douglas L Karlen, Innov Ener Res 2018, Volume 7
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Landscape design strategies for sustainable biomass feedstock supplies

Douglas L Karlen
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Sustainable bioenergy production requires abundant, reliable, and clean (low ash or soil contaminated) feedstocks. Potential cellulosic sources include crop residues (e.g., corn stover, small grain or sugarcane straw) and energy crops (e.g., switchgrass or miscanthus). Environmental, economic, and social sustainability are our focal point because plant biomass also supports critical ecosystem services including building and maintaining soil health. Our project team is striving to quantify sustainable crop residue harvest and energy crop production goals for different soil resources and landscape positions. We are examining seed, fertilizer, water, herbicide, labor, machinery costs and many other metrics through simulation modeling and on-farm field research. It is important to recognize that agricultural biomass (perennial energy crops and crop residues) can be used to produce liquid fuels, chemicals, and heat/power. Direct comparisons to the wind and solar energy production would only be partially relevant. Our primary (targeted) end users are producers of liquid biofuels. For that purpose, one ton of agricultural biomass will produce about 70 gallons of ethanol. If used for heating, one ton of agricultural biomass will produce about 14 million Btu. If used for power generation in an efficient production facility, one ton of agricultural biomass can yield approximately 1,250 kWh of electricity. Currently, perennial energy crops can yield between 3 and 8 tons (or more) per acre depending on plant species and field conditions. Although land-use issues are an important component associated with biomass energy production, this project is pursuing an innovative strategy for identifying less profitable areas within current crop production fields and targeting them for energy crops. Our goal is to provide a land base for energy crops that do not infringe on highly productive agricultural lands, thereby simultaneously increasing both land-owner and environmental benefits (i.e., better soil health) on lands currently having negative environmental impacts due to soil erosion, nutrient leaching, loss of soil organic carbon, or emission of greenhouse gases. Examples of soil health measurements on row-crop versus perennial Conservation Reserve Program (CRP) land, using physical, chemical, and biological indicators, and being interpreted with the Soil Management Assessment Framework (SMAF) will be discussed.

Biography

Dr. Douglas L. Karlen is a Distinguished Senior Research Soil Scientist with the USDA-ARS at the National Laboratory for Agriculture and the Environment (NLAE) in Ames, IA. His research on soil quality assessment and sustainable bioenergy/bio-product feedstock harvesting is recognized internationally. He is author or co-author of 235 journal articles and more than 150 other publications. Doug is a Fellow of the American Society of Agronomy, Crop Science Society of America, Soil Science Society of America, Soil and Water Conservation Society, and recipient of the Hugh Hammond Bennett award for national and international leadership in natural resources conservation.

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Notes:

Willem Lange, Innov Ener Res 2018, Volume 7
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Renewable revolution: Geothermal heat pumps are substantially changing the renewable landscape with thermal energy

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Renewable thermal energy is a vast untapped resource easily accessible around the planet. At the same time, nearly half the energy used in homes and office buildings is for thermal energy. Geothermal heat pumps already harvest terawatt-hours of renewable energy every year to provide heating, cooling, and hot water from Alaska to Florida. The Lifecycle Cost of Energy from these heat pumps is lower than any other form of renewable energy today while operating efficiencies range from 100% - 500% more efficient than existing alternatives.

Implementing widespread use of geothermal heat pumps can drive de-carbonization and eliminate on-site fossil fuel use. In fact, this is a critical part of Environmentally Beneficial Electrification.

There are a number of compelling reasons to learn more about this powerful technology:

- The 30% US Federal Tax Credit is back in place for geothermal heat pumps.
- Geothermal heat pumps harvest renewable energy more efficiently and more economically than any other available heating and cooling solution.
- Delivering 15 – 30 MWh of renewable energy per home per year, geothermal heat pumps harvest thermal energy at less than $0.03 per KWh over 30 years.
- Utilities are eagerly seeking Environmentally Beneficial Electrification where carbon fuels are used. That's what geothermal heat pumps do better than anything else.
- The US grid is de-carbonizing rapidly; geothermal heat pumps capitalize on that trend.
- Widespread understanding of how geothermal works, and its impact, is key to our greener future.

Biography

Will Lange has a diverse background in the US Coast Guard and the HVAC industry. With experience ranging from political liaison assignments in Western Africa to Fortune 50 Product Management, since 2010 he has dedicated his career to the cause of harvesting renewable thermal energy with geothermal heat pumps.

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Notes:

Evangelos I Gkanas et al., Innov Ener Res 2018, Volume 7
DOI: 10.4172/2576-1463-C2-005

Novel hybrid-powered stand alone autonomous unmanned aerial vehicle (AUV) ground base station

Evangelos I Gkanas and **Thomas Statheros**
Coventry University, UK

The technology of Autonomous Unmanned Vehicles (AUV) for air, land or sea applications has grown dramatically in the recent years, and continue to grow exponentially. With the above increase, in both autonomous systems and autonomous navigation algorithms a demand for efficient and reliable alternative renewable power sources is vital to fully support long endurance autonomy. Recently, a new type of Ground Stations has arisen, which it is fully autonomous, self-contained and automated in terms of Autonomous Unmanned Vehicle (AUV) deployment, refueling, recharging and storing. Two of the main and highly desirable requirements for the above state-of-the-art Ground Stations for Autonomous Unmanned Vehicles are; to be off-grid and to have a low maintenance interval (by a human technician and/or operator). Thus, it can be permanently and reliably located to remote locations and perform a variety of tasks from agriculture and geology to defense and surveillance. Therefore, a safe, low maintenance, efficient and high-power density energy source is needed to enhance and support a hybrid power architecture and extend the power autonomy of such AUV base station. The main outcome of the current project will be the design and development of a novel hybrid renewable power system (combination of battery, supercapacitors, solar, wind, and hydrogen), which will be part of the design and development of the prototype of the stand-alone novel Ground Stations for Autonomous Unmanned Vehicles.

Biography

Dr. Evangelos I. Gkanas has completed his PhD in Advanced Energy Materials at the National Centre of Scientific Research "Demokritos", Athens, Greece. He continued his research endeavors as Research Fellow at the University of Nottingham (UK). He is the leader of the Hydrogen for Mobility Research Group at Coventry University (UK), where he is also an Assistant Professor in Thermodynamics. He has published more than 20 scientific outcomes at peer-reviewed journals and serving as an editorial board member in several journals.

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Notes:

Sardar AhsanYounus, Innov Ener Res 2018, Volume 7
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Community driven initiative to reduce fossil fuel consumption for environmental protection and associated economic benefits

Sardar AhsanYounus
USAID-Pakistan Energy Office Projects, Pakistan

Naran is a famous tourist attraction in Pakistan in Khyber Pakhtoonkhwa province. Naran hosts high-rise Himalayan mountains covered with snow and lakes. Summers are cool, which attracts hundreds of thousands of tourists. Hotel industry here has a strong base with modern accommodation facilities. There was no power supply from the national grid to Naran in 2012 due to disruption of power supply resulting from heavy snowfall in previous years. People had to use fossil fuels i.e. diesel, gasoline, and firewood to operate power generators and to use heat for cooking and water heating. Firewood from forest cutting is a major environmental concern in Naran and surrounding valleys. It impacts the local environment negatively which is evident from the complaints of locals that rain and snowfall have reduced considerably in the last decade while flash floods are now common with landslides and road blockades. In an effort to control forest cutting, reducing the use of fossil fuels and improving the hoteling business, Tourism Promotion Association of Kaghan (TPAK) along with 3 hotels and 15 houses agreed in 2012 to install a micro hydel unit of 75 kilowatts on a local stream. WISIONS institute of Germany provided funding for the technology while TPAK and local partners funded construction component. Miro hydel project started production of electricity in late 2014. A local SME, created for the sustainability of the project, owns the micro-hydel system. This study focused on electricity production through renewable resource and its contribution in avoidance of addition of carbon in the atmosphere. Data collected for the last three years indicates that the micro hydel project contributed in avoidance of 386.65 tons of carbon into the atmosphere in the last three years. The carbon avoidance in the year 2015 was 122.02 tons, in 2016 it was 135.10 tons and it was 129.53 tons in 2017. The project has contributed considerably to the reduction of wood and fossil fuel usage in Naran. Previously, the Diesel usage by 3 hotels in Naran in 2012 was 48,421 liters, gasoline usage was 19,696 liters and wood usage was 80,290 kg. The project is ready for carbon credit mechanism.

Biography

Sardar Ahsan Younus has completed his Ph.D. at the age of 40 years from England. He is the Head of Environment Department for USAID funded Energy Projects in Pakistan while serving at Techno Consult International, Islamabad, Pakistan. He has vast experience of working on Environmental Projects both in Public as well as Private sector.

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Notes:

Viscosity modeling and flow properties of non-edible oils as feed-stock in biodiesel production

Kenneth Okafor, Musa Danjaji and **Martin Figura**
South Carolina State University, USA

In a previous study, non-edible plant seeds were sought as sources of vegetable oils as alternatives to soybean oil which is the major source of oil feedstock for the manufacturing of biodiesel in the United States of America. Soybean oil as a resource also doubles as a staple food: it is the most widely consumed cooking oil (frying, baking and a condiment in salads). Commercially, soybean oil is also used in printing ink and oil paint formulations. Hence the motivation for the search for other oil sources especially for the non-edible/non-staple sources. In this study, several plant seeds which were selected based on their ease of cultivation and short maturation periods were investigated for the yields, densities and the degrees of saturation and compared to the soybean output as a benchmark. A further investigation is undertaken in the present study to compare the viscosities and the Cloud Point (CP) temperatures of the benchmark soybean oil and the non-edible oils that compared favorably to the soybean oil in terms of the yields and Iodine Values (IV). Different mathematical models were applied in the fitting of the measured viscosity data. However, since the models did not adequately represent the data in the region of interest (lower temperatures), a new mathematical model was developed which in combination with measured data were used to infer the Cloud Point temperatures of the oil samples. The inferred Cloud Point temperatures ranged from -17°C for the Lavender oil to 8°C for the Morning Glory oil. For the benchmark oil (Soybean), the Cloud Point temperature was inferred to be 0°C. Therefore, most of the sample oils had Cloud Point temperatures lower than for the benchmark which confirms these oil candidates as possible replacements of the benchmark.

Biography

Okafor graduated from the Ohio State University with a Ph.D in Nuclear Engineering in 1988. He is currently a professor of Nuclear Engineering at the South Carolina State University where he teaches courses in nuclear sciences and engineering. His areas of interest include Reactor Physics, Nuclear Criticality Safety and Renewable Energy. Prior to coming to South Carolina State University he worked at the Savannah River Laboratory (SRL) in Aiken, SC under Dupont and Westinghouse companies (facility operators) involved in research and development in reactor analysis and technical support in the handling and storage of nuclear materials.

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Notes:

Beatriz Ruiz Camacho, Innov Ener Res 2018, Volume 7
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Pt nanoparticles onto carbon base substrates as anodic materials for direct alcohol fuel cells

Beatriz Ruiz Camacho
Guanajuato University, Mexico

The search for new catalytic materials for direct alcohol fuel cells is the aim of this work. One of the main challenges presented by fuel cells is to have adequate catalytic material dispersed on a substrate to enhance its catalytic activity. We have synthesized by the ultrasound technique nanostructured electrocatalysts of Pt supported different carbon base substrates as i) carbon nanotubes (NTC) and ii) zeolite-carbon composite and compared with iii) Vulcan carbon with the goal of studying the effect of the properties of the substrate on the electrical conductivity for the methanol oxidation reaction (MOR) in acid media. Particle size and metal dispersion were evaluated by transmission electron microscopy (TEM) and X-ray diffractometer (XRD) technique was used to investigate the crystalline structure. Cyclic voltammetry (CV) and chronoamperometry (CA) were performed towards the methanol oxidation reaction (MOR) in acid medium. Preliminary results show the properties of substrates as porosity, surface area and the chemical surface of substrate modified the dispersion of Pt nanoparticles as well as the interaction of metal-support which is a parameter responsible for the electrocatalytic activity. Materials synthesized catalyze the MOR, however, different onset potentials and intensity of the forward and backward oxidation peaks were obtained. The presence of zeolite on the substrate plays an important role in the oxidation of methanol. When using carbon nanotubes as a substrate, the Pt/NTC shows low stability and low intensity of the oxidation peaks. As a conclusion, the ultrasonic method allows to obtained Pt nanoparticles less of 10 nm supported on different substrates, the electrochemical activity of the materials synthesized follows the tendency Pt/zeolite-C> Pt/carbon > Pt/NTC.

Biography

Beatriz Ruiz Camacho has completed her PhD at the age of 30 years from National Polytechnic Institute. She also obtained an MSc in Science and Materials Engineering from Autonomous Metropolitan University. Actually, She is a Chemical Engineering professor at the Guanajuato University. She has published as the first author in more than 15 papers in reputed journals and she is Vice-president of the Mexican Hydrogen Society. She is author and coauthor of chapters book related with materials for fuel cells. She is expertise in nanomaterials synthesis and characterization, fuel cells, electrocatalysts and renewable energy. She has given lectures at various national and international conferences.

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Notes:

Javier Fernandez-Garcia et al., Innov Ener Res 2018, Volume 7
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Controlled selectivity via kinetic resolution with transient operation

Javier Fernandez-Garcia[1], **V Matveeva**[3], **Cherkasov**[2], **EM Sulman**[3] and **EV Rebrov**[2,3]
[1]University of Leeds, United Kingdom
[2]University of Warwick, United Kingdom
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A transient operation has been previously considered in many industrial processes where either heat recovery or production rate can be considerably improved as compared to steady-state operation. The effect of periodic temperature oscillations has been studied in the hydrogenation and isomerization of D-glucose over a supported Ru-catalyst in a micro trickle bed reactor. It was found that the preferred reaction pathway depends on the frequency of periodic temperature oscillations. The catalyst based on ruthenium nanoparticle supported over hypercrosslinked polystyrene was tested in the reaction of hydrogenation/isomerization of glucose and maltose under radiofrequency heating in a continuous flow fixed bed reactor. The catalytic activity and selectivity were investigated under the steady-state and transient operation reactor modes. The transient operation of periodic temperature oscillations with a low amplitude of 14 °C showed a dramatic change in the reaction pathway altering the preferential reaction from hydrogenation to isomerization for both substrates studied. The period of temperature oscillations affects the hydrogen coverage which can determine the main reaction which takes place. The data shows that the transient operation mode could have a high impact on biorefinery because fructose is one of the main feedstocks for 5-hydroxymethylfurfural and other valuable compounds in the field. Moreover, the work demonstrates that a concept of a superior product selectivity achieved by introducing transient operation, which can likely be applied to other reaction classes and processes.

Biography

Dr Javier Fernandez-Garcia studied his bachelor (2002-2007) and master's degree (2010-2011) in Spain. He worked in industry from 2007 to 2014 in companies such as Saint-Gobain, XSTRATA, Biogas Fuel Cell and HUNOSA. He completed his PhD at University of Oviedo (2011-2014). After that he worked as a Research Fellow at University of Warwick from 2014 to 2016. Then he developed research activities in Stoli Catalysts Ltd (Spin-out company) and he was finally appointed as Lecturer in Chemical Engineering at University of Leeds in 2017.

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Notes:

Krzysztof Naplocha et al., Innov Ener Res 2018, Volume 7
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Thermal performance of the latent heat storage units with aluminium porous structures

Krzysztof Naplocha, Anna Dmitruk and **Jacek Kaczmar**
Wroclaw University of Science and Technology, Poland

The heat accumulators based on phase change materials (PCM) operate in charging/discharging cycles. Their effectiveness depends on the heat transfer rate and value of the latent heat of melted and solidified materials. Usually, they characterized by low thermal conductivity what increases thermal gradient inside the chamber and prolongs charging time. In order to enhance heat transfer from energy source various metal shapes like fins, pipes or foams can be embedded in PCM. Investment casting method offers manufacturing highly porous structures with developed surface and appropriate stiffness. In this work examination of heat transfer of composite PCM included paraffin and aluminium alloy spatial casting are shown. Thermal performance of laboratory accumulator with pure paraffin was tested and compared with results determined when metal foam or honeycomb structures were introduced into paraffin. Metal inserts accelerating heat transfer melted or cooled paraffin faster and thus charging/discharging time is reduced. Performed multiple charging cycles revealed some issues with fatigue damage of metal foam. In comparison to pure paraffin metal structures reduced temperature gradient within the chamber accumulator ca. 2-3 times. Convection of liquid paraffin can be slightly restricted therefore arrangement of honeycomb channels was examined and favorable position determined.

Biography

Krzysztof Naplocha has completed his PhD at the age of 33 years from Wrocclaw University o Science and Technology. He has been involved in various science project covering metal matrix composite materials reinforced with ceramic fibers or intermetallic skeletons. Currently, he is developing high porous metal structures produced by metal casting. Much of his work has been on improving heat transfer in energy storage systems. He has published more than 120 papers in reputed journals and is the co-author of Intermetallic matrix composites: properties and applications (Woodhead Publishing, 2018) and Advances in materials science research (NY: Nova Science Publishers, 2012).

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Notes:

Kuldip Kumar et al., Innov Ener Res 2018, Volume 7
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From waste treatment to resource recovery: A Chicago sustainability story

Kuldip Kumar, Albert Cox, Heng Zhang, Thomas Kunetz, Edward Podczerwinski and **Debra Shore**
Metropolitan Water Reclamation District of Greater Chicago, USA

The Metropolitan Water Reclamation District of Greater Chicago (District) was created in 1889 by the Illinois Legislature. It is a special purpose district that collects and treats wastewater generated by the City of Chicago and 128 suburban communities in Cook County and also has stormwater management authority for the county. The District's service area is 883 square miles. It operates and maintains seven water reclamation plants with a total design average flow of nearly two billion gallons per day, 22 pump stations, 560 miles of intercepting sewers, 34 stormwater detention reservoirs, seven aeration stations in the Chicago and Calumet River Systems, and the Tunnel and Reservoir Plan (TARP) including 109 miles of deep tunnels and three combined sewer overflow reservoirs with a combined storage capacity of over 20 billion gallons. In 2015, the District received authority to recover resources for resale from its operations to help offset treatment costs. This presentation will provide information on new programs at the District to recover nutrients, and generate biosolids products, energy, and clean water from wastewater and a wide range of other local renewable resources. The District has established a commitment to becoming a sustainable partner in the region by recovering resources, lowering carbon emissions, creating new revenue streams and promoting resiliency.

Biography

Kuldip Kumar is a Senior Environmental Scientist with MWRD Chicago. He was more than 25 years of experience in the area of water quality especially fate and transport of nutrients and other environmental stressors like pharmaceuticals and personal care products. For the last 5 years, his research has been focused on 'Resources Recovery from Wastewater'. He manages the research program on utilizing algae to recover nutrients from wastewater and develop markets for algae biomass based on its characteristics. He has published over 70 research articles/book chapters and has served on many federal grant review panels.

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Notes:

M Yusuf Abduh, Innov Ener Res 2018, Volume 7
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Effect of storage time on the properties of seeds, oil and biodiesel from *Reutealis trisperma*

M Yusuf Abduh
Bandung Institute of Technology, Indonesia

The time profile of moisture content for different fractions (PT-3, PT-7, PT-14, NPT-21) of trisperma seeds (*Reutealis trisperma*) was determined at a relative humidity of 67% and 27°C for a four months period. The diffusion coefficient of water in the trisperma seeds was determined using an analytical solution of the stationary diffusion equation and used to model the moisture content in the seeds. The total oil content of the seeds and the acid value of the extracted oil from the stored seeds were periodically measured for four months. The acid value of the extracted oil from the stored seeds increased for all conditions (1.1 to 2.8 mg KOH/g for PT-3, 1.9 to 9.9 mg KOH/g for PT-7, 3.4 to 11.6 mg KOH/g for PT-14 and 4.7 to 25.4 mg KOH/g for NPT-21). The acid value of trisperma oil and biodiesel that has been stored for four months (27°C, closed container) was also determined. Upon storage, the acid value of trisperma oil and biodiesel only slightly increased from 1.1 to 1.3 mg KOH/g and 0.4 to 0.43 mg KOH/g, respectively.

Biography

Muhammad Yusuf Abduh has completed his PhD at the age of 31 years from the University of Groningen. He is the co-founder of Bio Proshafa Karya and Biorefinery Society, start-up companies in the valorization of renewable sources to produce bioproducts. He has published more than 10 papers and has been serving as a reviewer in reputed journals.

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Selection and stability investigations of polymers for latent heat storages

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Semi-crystalline polymers offer many advantageous properties which are required for phase change materials (PCM) in latent heat storages. They exhibit high heats of fusion and a wide range of melting temperatures. Additionally, specific characteristics (e.g. thermal conductivity) can be easily tailored via compounding. However, only high-density polyethylene (HDPE) has been considered as suitable PCM so far. A Differential Scanning Calorimeter (DSC) was first used to identify candidate polymer classes according to their storage capacity and application temperature. The most promising polymer types were found to be: polyethylene (PE), polypropylene (PP), polyamides (PA), polyoxymethylene (POM) and polyethylene glycol (PEG). An HDPE, a PA 6, a PA 4.6 and a POM copolymer were further selected for application-oriented stability investigations. Cyclic and static thermal loads were applied to examine their thermal and thermo-oxidative stability. Thermal cycling was done in a DSC up to 3000 cycles in air and nitrogen atmosphere and thermo-physical characteristics were recorded simultaneously. Whereas the PA 4.6 degraded steadily, the thermo-physical characteristics of HDPE and the PA 6 were not affected. The stability of POM could be improved by utilizing a closed system. Static thermal outsourcing was done above melting temperature in circulating air ovens. Fourier Transform Infrared Spectroscopy (FTIR) revealed that degradation occurred mainly on the surface leaving the storage-relevant characteristics of the bulk unaffected. These results outline the applicability of polymers as PCM. This research project is funded by Klima- und Energiefonds (Austrian Climate and Energy Funds) and carried out within the framework of the program "Energieforschung". The Austrian Research Promotion Agency (FFG) is gratefully acknowledged for funding this work under Grant No. 848914 (StoreITup-IF).

Biography

Helena Weingrill is a PhD student at the Chair of Materials Science and Testing of Polymers at Montanuniversitaet Leoben in Austria. She finished the bachelor's and master's programme of Polymer Science and Engineering also at the Montanuniveritaet Leoben.

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Notes:

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Nano-structural design of 0D, 1D, 2D, 3D nanoparticles for energy storage devices: Supercapacitor applications

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[1]Yeungnam University, Republic of Korea
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Nano-structural design for energy storage devices depends on a variety of factors like as structure and properties of the nano-materials. The recent development in nano-structural design has opened up new frontiers by creating new materials and structures for efficient energy storage. In this research, we demonstrated the annealing-free synthesis of K-doped mixed-phase TiO_2 (anatase and rutile, AR) 0D nanoparticles, 1D nanowires, 2D nanosheets, and 3D nanofoams (K-TNF) on Ti foil at 150°C and 250_oC assisted by KOH(aq.)for electrochemical supercapacitors (ESCs). The aggregated network and the average diameter of K-TNF have slightly decreased with the increase of KOH(aq.) concentrations, while the amount of K-doping, Ti^{3+} interstitials, and –OH functional groups was substantially increased. The TiO_2 phase was entirely mixed of rutile and anatase, AR phase. All the K-TNF modified Ti electrodes (K-TNF/Ti) exhibited quasi-rectangular shaped cyclic voltammograms (CVs) in a wide potential range and the specific capacitance (Cs) for the optimal electrode with mixed AR phase TiO_2 obtained. The higher Cs for the optimal K-TNF/Ti electrode can be ascribed to the synergistic effect of mixed AR phase, a high percentage of K-doping (ca.20.20%), and Ti^{3+} interstitials (ca.18.20 %), respectively. The directional electron transport through the 1D channel as well as the –OH functional groups on the K-TNF surface also contributes to enhancing Cs. The K-TNF/Ti electrode discovered excellent stability with the Cs retention of ca. 95% and a very small change of internal series resistance (Rs) and charge transfer resistance (Rct) at the electrode-electrolyte interface after 3000-CD cycles.

Biography

Prof Hasi Rani Barai is the assistant professor in the School of Mechanical and IT Engineering, Yeungnam University, Gyeongsan, Korea, from 2015. She worked as a postdoctoral research fellow in the dept. of Chemistry and Nano science, Ewha Woman's University, Seoul, Korea. She worked as a postdoctoral research fellow in KCAP (Korea center for artificial photosynthesis) in dept. of Chemistry, Sogang University, Seoul, Korea. She received her PhD in the dept. of Chemistry, Inha University, Korea, Master of Science (Physical organic chemistry) and BSc in Chemistry in Dhaka University, Bangladesh. She published about 41scientific journals. She did several invited speaker/oral/poster presentations at national/international conferences. Research interest in nanotechnology, nanomaterial's, materials preprocesses energy storage devices, electrochemistry, and super capacitors.

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Notes:

Ipek Caglayan et al., Innov Ener Res 2018, Volume 7
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Analysis of wind energy potential: A case study of Kocaeli University campus

Ipek Caglayan, Anil Can Turkmen, Cenk Celik, and **Halil Ibrahim Sarac**
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In this study, a location in the campus of Kocaeli University has been selected where wind turbines are to be implemented. The obtained output power from wind energy will be examined. MERRA software and Windographer software have been used during this energy production study. The wind speed and direction analysis within 1 hour of resolution is being performed at some points by using MERRA program. Windographer automatically defines wind resource data such as wind speed, standard deviation, vertical wind speed, direction, temperature, pressure and relative humidity. Among the 4 point coordinates which are properly identified by the software, point "B" was selected. The annual wind data of the point "B" was analyzed and the annual amount of energy was calculated. In this study, GE 1.7-100 wind turbine was used. The generated energy and turbine output power was calculated. In this study, the output power of the selected turbine has been calculated using the software for modeling the wind speed at working altitude of the wind turbine. Thus, the producing power of the turbine has been calculated as 195 kW and energy in terms 1 704 959 kWh/year while considering the losses. Due to the selected point, the efficiency of the obtained energy of the wind turbine is %13, 2 without losses and %10, 9 with losses. The installation of the wind turbine at a selected point appears to be suitable. At selected points, the values, which were measured using the Windographer software, turned out to be similar to the given data. Generally, the measurement taken at the selected points does not always constitute to the timing and environmental conditions. In terms of timing and environmental conditions, the data obtained from MERRA and Windographer are commonly utilizing. The analysis, which is made, is valid for a single wind turbine installation. For installation of a wind turbine farm, as an addition to this analysis, some extra analysis software was used. This helps to achieve more realistic results for wind-turbine farm installation.

Biography

Ipek Caglayan has completed her BSc. degree at Kocaeli University and she is continuing her MSc. studies at Kocaeli University. She has worked on renewable energy specializing in Direct Borohydride Fuel Cells (DBFC) during her MSc. studies.

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Notes:

Oyenike Makanjuola et al., Innov Ener Res 2018, Volume 7
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The development of Sorghum bran based bio-refinery process

Oyenike Makanjuola and **Chenyu Du**
University of Huddersfield, UK

The project aims to develop a sorghum waste biomass-based bio-refinery process to convert sorghum bran into value-added products. Sorghum bran is a food waste rich in starch and cellulose, making it a suitable substrate for bio-refinery process development. Solid state and submerge fungal fermentations were carried out first to culture A. awamori for the production of glucoamylase and alpha-amylase. Then the enzyme solutions were used for the enzymatic hydrolysis of sorghum bran for the production of a glucose-rich fermentation medium. The impact of pH, temperature, yeast extract, mineral content and inoculation ratio on enzyme activities were investigated in both solid-state fermentation and submerged fermentation. Response Surface Methodology (RSM) was used to further optimize the glucoamylase activity. The hydrolysis efficiency of sorghum bran using the enzyme solution was evaluated and sorghum bran hydrolysate was used as the substrate for the production of bio-ethanol and itaconic acid, demonstrating the feasibility of converting a sorghum waste biomass to value-added products via a sustainable and environmentally friendly process.

Biography

Oyenike Makanjuola obtained her B.Sc from Bowen University, Nigeria in 2011 and obtained her M.Sc at the University of Huddersfield in 2014 with a Distinction. As a result, she was awarded the Vice-chancellor Scholarship for her Ph.D. programme at the University of Huddersfield. Oyenike is currently a 3rd year Ph.D. student in the School of Applied Sciences, the University Of Huddersfield. Her research area focuses on the conversion of sorghum waste biomass and wheat straw into value-added products.

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Notes:

Anil Can Turkmen et al., Innov Ener Res 2018, Volume 7
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The effect of different catalyst layer porosity on proton-exchange membrane fuel cells

Anil Can Turkmen[1], **Cenk Celik**[1], **Halil Ibrahim Sarac**[1] and **Bulent Mutlu Dogru**[2]
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Nowadays, due to the development of relevant technology for renewable energy sources and the effects of global warming, it has increased considerably. Especially with the introduction of electric vehicles on the market, energy storage solutions are at the forefront. The use of batteries in this regard is quite popular, but it has not been able to solve various problems of battery technology (length of charging time, a risk of explosion, etc.). In this sense, the studies on the fuel cell technologies, which are supposed to produce and use the energy in place, have gained speed. The fuel cells are still in development. Proton Exchange Membrane Fuel Cells (PEMFC), which are especially low temperature fuel cells, are highly promising. In the study, the effect of the porosity of anode-side catalyst layers on the performance of proton exchange membrane fuel cells was modeled. In the prepared model, all geometric parameters and material properties except the catalyst layer porosity are kept constant. The catalyst porosity was maintained between 0.1 and 0.5 and a parametric study was carried out with variations of 0.1. Obtained from the current-voltage graphs, the catalyst layer ensures maximum performance over a certain range of porosity. The highest performance was observed in the fuel cell using a catalyst with a porosity value of 0.2. The low performance of the fuel cell using catalysts with porosity values of 0.5 and 0.1 revealed that this value should be limited. The results of the work done were compared with the models in the literature and the model was verified.

Biography

Anil Can Turkmen has completed his B.Sc. and M.Sc. at the age of 27 years from Kocaeli University and he worked in Lund University/Sweden, for 1 year. He has published more than 15 papers. He was working on modeling and experimental study about Proton Exchange Membrane Fuel Cells and Direct Borohydride Fuel Cells.

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Notes:

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Thermal properties improvement of column structures formed by nickel nano-materials in paraffin wax

Che-Fu Su, Junwei Su, Hamed Esmaeilzadeh, Jirui Wqang, Edward Fratto, Majid Charmchi, Zhiyong Gu and **Hongwei Sun**
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Enhancing the thermal conductivity of phase change materials (PCMs) is attracting attention for renewable energy applications such as solar, geothermal and wind energy. The use of energy storage can significantly improve the efficiency of renewable energy systems due to their intermittent nature. Latent heat thermal energy storage is a particularly attractive technique due to its high capacity and its ability to store energy at a nearly constant temperature corresponding to the phase transition temperature of the PCM. Among the PCM, paraffin wax has been widely investigated and selected for latent heat thermal energy storage applications due to its characteristics of high latent heat, chemical stability, less super-cooling, non-corrosive, and low vapor pressure. However, most paraffin waxes have an unacceptably low thermal conductivity (e.g. paraffin: ~0.25 W/m^{o}C). This has severely limited the application of current PCMs for high power, transient and large scale systems and is one of the major challenges facing energy industries such as renewable energies and waste heat recovery. The present work aims to overcome this undesirable property by manipulating metal fillers including nickel (Ni) nanoparticles/nanowires within the paraffin wax to improve its thermal conductivity. The column structure of Ni fillers in paraffin wax was formed by exposing it to a uniform magnetic field while the temperature of the composite was maintained above the melting temperature of paraffin wax and then cooling down the materials quickly to its solidification temperature. The formation of magnetic dipoles in Ni fillers and the induced moments interacting with each other leads to the formation of columns of particles/nanowires under the external magnetic field. It was found that the column structure formed depends on several parameters such as the strength of the magnetic field, material and geometry of particles, and viscosity of melted PCM. In addition, a finite element method is also developed to investigate the motion phenomenon for Ni fillers suspending in a non-magnetic fluid under a uniform magnetic field. The correlation between thermal conductivity, magnetic processing parameters, and filler column structures will be presented in this paper.

Biography

Che-Fu Su is a PhD student of the University of Massachusetts Lowell. He received an M.S. from the West Texas A&M University in 2007 and James E. Moreland Safety Scholarship when he was pursuing his M.S. degree. Now, his research interests lie in the area of Phase Change Materials, especially for thermal conductivity enhancement. He mainly focuses on the design of the apparatus setup and sample fabrication for this research project, and this research is funded by the National Science Foundation.

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Notes:

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Spatial agent-based modeling for dedicated energy crop adoption and cellulosic biofuel commercialization

Enze Jin and **John W Sutherland**
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Dedicated bioenergy crops, such as perennial grass and short rotation trees, are qualified as cellulosic biofuel feedstocks to meet the requirement for advanced biofuel in the expanded Renewable Fuel Standard. The utilization of dedicated energy crops for cellulosic biofuels is still in the early stage or pilot scale, and the existing cellulosic biorefineries are yet to be commercialized. This study develops an agent-based model to simulate the spatial diffusion of switchgrass (*Panicum virgatum L.*) adoption in Indiana cropland from 2015 to 2027 under various biofuel market scenarios. Results indicate that it is only economically viable to produce 1,115 million gallons (4220.7 million liters) cellulosic ethanol from switchgrass annually in Indiana from 2015 to 2023 given an average annual farm gate price of $123.93 t-1 for feedstock. This study also finds that the high productivity of switchgrass can increase farmers' adoption rates and secure a stable feedstock supply. Moreover, it reveals that the high equipment costs required for scaling up production capacity and the highly variable operating cost of cellulosic biofuel production will inhibit the viability of commercializing cellulosic biofuels with a stable supply of feedstock. Financial incentives for cellulosic biofuel production have a significant impact on promoting the adoption of dedicated energy crops in Indiana. This paper provides useful insights for biorefinery inventors and policymakers to facilitate the commercialization of cellulosic biofuels by understanding the effects of farmers' decisions on the adoption of dedicated energy crops.

Biography

Enze Jin is a PhD candidate in Environmental and Ecological Engineering in Purdue University. He has a Master degree of Biosystems and Agricultural Engineering from Oklahoma State University and a bachelor degree of Mechanical Engineering from China Agricultural University. His research focuses on the sustainability assessment of bioenergy systems in terms of environmental, economic, and social impacts.

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Biogas a viable untapped alternative energy for abattoirs of Dar es Salaam

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Dar es Salam as one of the enlarging cities characterized by rapid increase in the population coupled with high generation rates of wastes of different categories from different sources; slaughterhouses inclusive. The augmented rate of demand for abattoir products has accelerated the rate of animals being slaughtered daily and so is the rate of abattoir related wastes. This is worsened by unsustainable waste management strategies which threatens the health status of not only the surrounding communities but also Dar es Salaam urbanites at large. Despite the biogas generation technology depending on the abattoir wastes is one of the sustainable waste management strategies as it will reduce the rate of waste to the environment as well producing a clean alternative energy, it has not been adopted in the slaughterhouses of Dar es Salaam. Therefore the study was inevitable as it aimed at identifying the reasons for the slow adoption of Biogas Technology (BGT) by the slaughterhouses. The study utilized purposive sampling in using Dar es Salaam city due to its being populous as well as the City abattoir of Vigunguti and Mazizini slaughterhouse at Ukonga because of their high number of slaughtered animals. During the study snowball sampling was used to administer an in-depth interview to those associated with the slaughter process on how the waste is dealt with and with the management of the slaughterhouses. In addition to that observation technique was adopted checking on how waste is collected and disposed. The study had to identify the typology of abattoir waste, to examine the waste collection and disposal methods used as well as the limitations to BGT at the slaughterhouses. Basing on the data obtained from field observations, face-to-face interviews undertaken from the butchers, slaughterhouse administrators, waste revealed that the most generated abattoir waste is in form of leftover meat, blood, and dung; abattoir waste is haphazardly disposed in the open space, the alternative waste disposal methods could be burning, burying and use for animal feeds though burning was hampered by the dark smoke, the limitations for adopting BGT were lack of effective & clear policies, lack of awareness, etc. The study recommends laying a basis for waste sorting, adoption of BGT which is to play a significant role in abattoir waste management and controlling the emission of GHGs.

Biography

Ahmed Lubwama is a prospective PhD student of the Open University of Tanzania currently preparing the concept note for full enrollment. He completed the Master's degree of Natural Resource Assessment and Management at the same university. He wrote a paper which is expected to be published with The Journal of Solid Waste Technology and Management.

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Scientific Tracks & Abstracts

Day 2

Taro Yamada, Innov Ener Res 2018, Volume 7
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Overall solar water splitting reactor and plant design towards mass production of H_2 and O_2

Taro Yamada
The University of Tokyo, Japan

This paper overviews our ongoing research and development in designing the sunlight-driven self-running plant for H_2+O_2 generation from water as the technical goal of our all-Japan research project "Japan Technological Research Association of Artificial Photosynthetic Chemical Process" (ARPChem). Among various principles and real materials for photocatalytic water splitting, we herein focus on the type of powder photocatalyst from a single light-absorbing material. In this case, H_2 evolution from H^+ and O_2 evolution from OH- in water simultaneously run on a light-responding solid particle generating carriers therein, by the aid of "co-catalytic" materials dressing the surface. For our benchmark pilot plant, we use $SrTiO_3$, the most developed and successful powder photocatalyst. The original study of stoichiometric $2H_2+O_2$ evolution by ultraviolet light was performed on $SrTiO_3$. Later, Al-doped $SrTiO_3$ was introduced as an UV-active stoichiometric water splitting single-powder photocatalyst that realizes a quantum efficiency of 69% at 320 nm by the aid of CrOx+Rh cocatalyst. Because of the small fraction of UV light within the sunlight, the solar-to-H_2 energetic conversion efficiency is approximately 0.6 %. Nevertheless this simplicity of water photo-splitting mechanism is a preferable feature in designing solar plants. In this talk we will further discuss on the design for the photoreactor containing the photocatalyst, inhaling water and exhaling the product gas mixture. The following processes for safe transportation of explosive $2H_2+O_2$ mixture and operation of H_2/O_2 separation membrane will be also generalized.

Biography

Taro Yamada earned his Ph.D. degree at the University of Tokyo in 1984 and since then he occupied professional research scientist's positions at the Institute for Solid State Physics/the University of Tokyo, ERATO/JST, Waseda University, RIKEN institute and now is a leading member of Japan Technological Research Association of Artificial Photosynthetic Chemical Process (ARPChem) at the University of Tokyo. He has published more than 130 scholarly articles in the basic fields of surface science, catalysis, electrochemistry, and photocatalysis.

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Production of hydrogen rich gas from tea waste

Nezihe Ayas and **Tugce Esen**
Anadolu Universtiy, Turkey

Hydrogen is an energy carrier, which stores and delivers energy and produced from fossil fuels and renewable energy sources such as biomass, wind, solar, geothermal, and hydroelectric power to split water. Biomass gasification is a process in which biomass is converted into gaseous components by applying heat in the presence of air/oxygen and steam. Within the scope of this study, tea waste was gasified in the presence of Ni-CeO_2/Al_2O_3 catalysts using air as gasifying agents. The Ni-CeO_2/Al_2O_3 catalyst was synthesized by the co-impregnation method and characterized by XRD, XRF, SEM and BET techniques. The effect of gasification parameters such as temperature (650, 850°C), CeO_2 loading (0-40 wt.%) at constant 3 L/h air flow rate, on the gaseous product distribution was examined. The main gas components were determined as H_2, CH_4, CO, and CO_2 by micro gas chromatography analyzer. The maximum H_2 content of the gas mixture was achieved as 5.98 mol H_2/kg tea waste at 850°C, 15 min., 20% catalyst ratio and 3 L/h air flow rate in the presence of Ni-CeO_2/Al_2O_3 contained 40% CeO_2.

Biography

Nezihe Ayas is a doctor of chemical engineering, a professor at Anadolu University, Faculty of Engineering, Department of Chemical Engineering. She is Head of Unit operations and Thermodynamics Division, supervisor of biofuel laboratory at Chemical Engineering Department. She has an experience in research of biofuel, gasification of biomass, hydrogen production from biomass, catalyst synthesis for biofuel and hydrogen production. She is an author and a co-author of several publications related renewable energy such as biodiesel, hydrogen from biomass in supercritical water gasification, hydrogen from biomass by gasification and steam reforming, catalyst synthesis for hydrogen production. She teaches students in the fields of Thermodynamics, Mass Transfer, Obtaining hydrogen from biomass, and others.

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Challenges and opportunities facing by China's renewable energy development

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Since 2006, China's renewable energy has developed very quickly with average annual wind power and solar power increase rate by 50% and 90% respectively, which is much higher than the average level, 20%, and 49%, in the world (BP, 2017). China has become the largest wind power capacity and solar power capacity country in the world. However, on the other side, some obstacles still exist in the process of renewable energy development in China. First, large amount of wind power and solar power is curtailed in China. Second, the fiscal subsidy gap for renewable energy is huge. Third, a series of policies aimed to resolve the issues of wind power and solar power curtailment have not been implemented effectively. China's specific characteristics of resources, economics, and politics determine that resolving of the above problems is facing big challenges. In contrast, China's renewable energy is facing important opportunities for further development. Based on analyzing these challenges and opportunities, we put forward the key measures to resolve the obstacles of China's renewable energy development in the future. Firstly, we discuss how to motivate China Grid Corporation to dispatch more renewable energy by adjusting the regulation mechanism. China Grid Corporation plays a significant role in dispatching renewable energy, currently, China Grid Corporation pays more attention to profit instead of promoting renewable energy. Hence, how to motivate China Grid Corporation to dispatch more renewable energy by adjusting the regulation mechanism is important; second, we analyze how to promote renewable energy generation by optimal design of China's power market mechanism. Third, we illustrate how to formulate appropriate environmental regulation policies to promote the competitiveness of renewable energy by studying the various impacts of the carbon tax and Cap & Trade on renewable energy development. Fourth, we suggest electricity storage by batteries and also P2G should be motivated.

Biography

Xiaoli Zhao has completed his PhD from the Renmin University of China. She is the director of the Institute for Low Carbon Economy and Policy, China University of Petroleum-Beijing, Prof. She is the secretary general and executive member of The Branch of Energy & Resource Systems Engineering, Systems Engineering Society of China. She has published more than 80 papers in reputed journals and has undertaken four energy research projects awarded by China's National Natural Science Foundation as a project leader.

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Earth-abundant nanostructured materials for efficient solar fuel production

Nageh K Allam
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If solar energy is to become a practical alternative to fossil fuels, we must have efficient ways to convert photons into electricity, fuel, and heat. To this end, direct solar energy conversion to storable fuels offers a promising route toward less reliance on fossil fuels. The development of a successful solar-fuel-generation technology would require the invention of new photoactive materials that accomplish the combined tasks of light harvesting, charge separation, and compartmentalized chemical transformations. One of the most critical issues is the development of a suitable semiconductor photoanode with high efficiency and long-term durability in aqueous environments. In addition, the lack of effective oxidation and reduction catalysts is among the most serious obstacles preventing the development of an efficient and scalable artificial fuel generator. In this regard, nanoscience can make a difference. This talk will cover the assembly and development of new semiconductor nanoarchitectures as well as interface control for the purpose of solar energy conversion in general and direct solar-to-chemical energy conversion in particular.

Biography

Nageh Allam received his PhD in materials science and engineering from Pennsylvania State University and pursued his postdoctoral studies at both Georgia Institute of Technology and Massachusetts Institute of Technology (MIT). He joined the faculty at The American University in Cairo (AUC), where he is currently an Associate Professor with tenure. Allam's research is multidisciplinary in nature as it is at the interface between nanoscience, physics and chemistry. It deals with the development of a set of synthetic and fabrication techniques to obtain well-designed nanostructured materials with composition, size and shape control for use in energy conversion and storage, sensors applications, biomedical applications, among others. The research comprises both experimental and theoretical activities. He has published more than 120 papers in reputed peer-reviewed international journals and has authored more than 90 conference articles. He is the recipient of the Ford Foundation international graduate fellowship, RAK-CAM postdoctoral fellowship, the World Academy of Sciences (TWAS) Yong Scientist Award, the Showman Foundation Award in Applied Sciences, the State of Egypt Award in Advanced Technological Sciences and the AUC Excellence in Research and Creative Endeavors Award.

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Notes:

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Investigations of non-edible seeds oils in comparison with soybean benchmark for production of biodiesel

Musa Danjaji, Kenneth Okafor, Martin Figura and **Valerie Nwajewi**
South Carolina State University, USA

The desire to reduce green-house gases due to excessive use of fossil fuels for energy production is a major stimulant for alternative clean sources of energy. One of these alternative sources is biodiesel with vegetable oil as a component. However, soybean oil, which is a major food condiment is the major vegetable oil used in the USA. The present study seeks to explore suitable and sustainable sources of oil from non-edible seed plants that are indigenous to the state of South Carolina. Seed plants were obtained from the wild or purchased. Comparisons of the yields and other physical and chemical properties were determined and compared to soybean oil as the benchmark. All the seeds in this study underwent the same processes in oil extraction and determination of their properties. The physical and chemical properties determined for all seeds were the oil yield, density and the iodine value. Most of the oil samples in this study have characteristics that are comparable to those of the Soybean which is the benchmark sample. For example, most of the oil samples produced yields greater than 7% the yield for the soybean oil. It can also be inferred from this study that any one of the comparable seed plants mentioned above can serve as an alternative feedstock to Soybean in the commercial production of Fatty Acid Methyl Esters (FAME).

Biography

Professor Musa Danjaji is the Academic Program Coordinator for the Nuclear Engineering (NE) program and also serves as the Director, for the Center of Energy Studies at South Carolina State (SC State) University. Prior to coming to SC State, Professor Danjaji held joint appointments as a research scientist/engineer at the Army Environmental Policy Institute and the United States Army Construction Engineering Research Laboratory. He obtained his Masters and Ph.D. in Nuclear Engineering from the University of Illinois, Urbana-Champaign. He has also obtained his Bachelors and Masters in Physics from Ahmadu Bello University in Nigeria.

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